

**Remarks/Arguments:**

**I. Summary of the Invention**

The present invention is directed to a process and system for the treatment of exhaust gases from a diesel engine. The process first catalytically oxidizes HC either contained in the exhaust gas or introduced by another means. Then, the process utilizes the oxidized hydrocarbons to catalytically convert NO in the exhaust gas to NO<sub>2</sub>. The system also traps particulate matter or soot to be burned. In this manner, the NO<sub>2</sub> produced facilitates combustion of the trapped soot. For convenience, claim 1 is recited below.

1. A process of treating internal combustion engine exhaust gas containing O<sub>2</sub>, NO<sub>x</sub>, unburnt hydrocarbon ("HC"), CO and soot, comprising:
  - i. catalytically oxidizing a substantial part of the HC;
  - ii. catalytically treating the product of step i to oxidize NO to NO<sub>2</sub>;
  - iii. collecting soot; and
  - iv. combusting the collected soot by reaction with the NO<sub>2</sub> and possibly any O<sub>2</sub> left over after steps i and ii.

**II. Discussion of Cited References**

Hsiao et al., U.S. Patent Number 5,891,409: The Hsiao reference was filed as a continuation-in-part application to U.S. Patent 5,711,147. Interestingly, the Penetrante reference cited in the previous Office Action is also related to U.S. Patent 5,711,147. In fact, of the disclosure of Figs. 1-9; col. 9. lines 36-67; cols. 10-12 lines 1-67; and col. 13, lines 1-58, cited in Hsiao by the present Office Action, only col. 11, lines 64-67 through col. 12, lines 1-8 and col. 13 lines 1-15 and 38-58 are different from Penetrante. Hsiao is directed to a preconverted nitric oxide gas in a catalytic reduction system having two stages. The first is an oxidative stage to convert NO to NO<sub>2</sub> in the presence of O<sub>2</sub> and the second is a reductive stage to convert the products of the first stage through use of a plasma arc.

**III. The Office Action**

Claims 1 and 2-49 are pending. The Office Action rejects claims 1, 3-14, 16-31, 33-36, 38-43, and 45-48 under 35 U.S.C. § 102(e) as anticipated by Hsiao, U.S. Patent No. 5,891,409. The Office Action also rejects claims 32, 37, 44, and 49 under 35 U.S.C. § 103(a) as being

unpatentable over Hsiao in view of design choice. With this response, the applicants respectfully traverse the rejections and request the Examiner's reconsideration.

**A. Lack of Anticipation**

The Office Action rejects claims 1, 3-14, 16-31, 33-36, 38-43, and 45-48 under 35 U.S.C. § 102(e) as anticipated by Hsiao, U.S. Patent No. 5,891,409. Hsiao discloses two embodiments. The first is illustrated in Figure 3 and the second in Figure 9. As should be clear from Figure 9 and the associated description at column 13, line 38 through column 14, line 13, the Figure 9 arrangement teaches an oxidation catalyst 110 for oxidising NO to NO<sub>2</sub>, a source of reductant HC 112 downstream of catalyst 110 and a lean-NO<sub>x</sub> catalyst 116 for reducing NO<sub>2</sub> with the reductant. The applicants fail to find any teaching, in the cited text of Hsiao, of step (i) of the presently claimed invention, i.e. "catalytically oxidizing a substantial part of the HC." Similarly, the applicants also fail to find any teaching of "a first catalyst to receive an engine exhaust and effective to promote oxidation of HC therein," alone or in combination with a "second catalyst receiving the product of the first catalyst and effective to promote oxidation of NO to NO<sub>2</sub>" as recited in claim 16.

Similarly to the previous Office Action citing the Penetrante reference as anticipating the claims under Section 102(e), Figure 3 includes a means for generating plasma. This is a fundamentally different process from the claimed invention. For example, processor 74 is not a catalyst and does not comprise a catalyst, it is a plasma processor (see column 8, lines 36-41) comprising a stainless steel corona wire 60 disposed between corona balls 66 and including a bed of silica beads for trapping and oxidising soot. Therefore, the oxidation of HC in Hsiao is carried out with a plasma arc and is non-catalytic. In contrast, claim 1 of the present invention recites step (i) requiring "catalytically oxidizing a substantial part of the HC."

In addition, Hsiao discloses feature 78 as a catalytic convertor disposed downstream of processor 74 for the selective reduction of NO<sub>2</sub> (see column 8, lines 52-59). Hsiao teaches that the NO in the product of the plasma step is then catalytically reduced. Again in contrast to Hsiao, claim 1 recites catalytically treating the product of step (i) to oxidize NO to NO<sub>2</sub>.

## **B. Non-obviousness**

The Office Action rejects claims 32, 37, 44, and 49 under 35 U.S.C. § 103(a) as being unpatentable over Hsiao in view of design choice stating that there is nothing in the record establishing the claimed parameters present novel or unexpected results. Notwithstanding the fact that claims 32, 37, 44, and 49 depend from allowable claim 1, the applicants submit that claims 32, 37, 44, and 49 are also patentable for the following additional reasons.

The distinctions between the invention claimed in claims 32, 37, 44, and 49 and Hsiao are not, as the Office Action suggests on page 5, a mere matter of design choice. The Office Action indicates that ranges may give some patentable weight if they are determined to be critical ranges and that the applicant has the burden of proving such criticality. The applicants respectfully submit that the Examiner has incorrectly applied this burden. As stated in M.P.E.P. § 2144.05, a particular parameter must first be recognized by the prior art as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of the variable might be characterized as routine experimentation or design choice. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) (The claimed wastewater treatment device had a tank volume to contractor area of 0.12 gal./sq. ft. The prior art did not recognize that treatment capacity is a function of the tank volume to contractor ratio, and therefore the parameter optimized was not recognized in the art to be a result-effective variable.). Hsiao fails to specify platinum loading as a variable which achieves a recognized result. In fact, the applicants fail to find any teaching in Hsiao of a platinum loading value. Therefore, the applicants submit that claims 32, 37, 44, and 49 are allowable not only because they depend from allowable claim 1, but also because the loading range must first be demonstrated to be a result effective variable before the applicants have the burden of showing the criticality of the loading value range in the present invention.

## **II. Conclusion**

The applicants submit that Hsiao fails to teach or suggest the recited steps as claimed in the present invention. Secondly, the applicants additionally submit that Hsiao fails to set forth the criticality of the platinum loading values as result effective variables, thus the applicants do not have the burden of showing the patentability of the claimed ranges. The applicants respectfully traverse the grounds for rejection and request the Examiner's reconsideration.

Appln. No.: 09/857,386  
Amendment Dated March 30, 2004  
Reply to Office Action of December 30, 2003

JMYT-244US

Finally, the applicants' undersigned representatives request a telephonic interview with the Examiner if such action will expedite the prosecution of the application or if the Examiner has any suggestions or questions concerning the application or the present Response. If the claims of the application are not believed to be in full condition for allowance, for any reason, the applicants respectfully request the constructive assistance and suggestions of the Examiner in drafting one or more acceptable claims pursuant to MPEP § 707.07(j) or in making constructive suggestions pursuant to MPEP § 706.03 so that the application can be placed in allowable condition as soon as possible and without the need for further proceedings. The applicants' representatives, Christopher R. Lewis or Christian M. Bauer, can be reached at 610-407-0700, M-F between the hours of 9:00 a.m. and 5:00 p.m.

Respectfully submitted,



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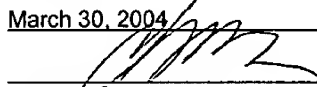
Dated: March 30, 2004

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March 30, 2004



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Christopher R. Lewis

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